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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
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ART UNIT	**PAPER NUMBER**
1753	

DATE MAILED: 08/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/777,800	BECKER ET AL.	
	Examiner	**Art Unit**	
	Rodney G. McDonald	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14,17-27,29-31 and 33-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14,17-27,29-31 and 33-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 9, 2006 has been entered.

Claim Rejections - 35 USC § 112

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is indefinite because it is unclear if the phrase "in particular of a binary photo mask blank, a phase shifting photo mask blank or an extreme ultra violet photo mask blank" is meant to further limit the claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 29, 30, 34-36 are rejected under 35 U.S.C. 102(b) as being anticipated by Mitsui et al. (EP 1 022 614 A1).

This rejection is made interpreting the claims as product claims. The process limitations are given no weight since the product can be produced by other processes.

Regarding claim 30, Mitsui et al. teach a photomask blank. In Fig. 1 the photomask blank comprises a quartz glass substrate, a chromium nitride film as a first shading film, a chromium carbide film as a second shading film and a chromium oxynitride film as an anti-reflective film. (Column 7 lines 44-57) No film stress will exist when the CrC film is formed in a thickness of approximately 250 to 1100 Angstroms and the CrON film in film thickness of approximately 200 to 300 Angstroms. (Column 12 lines 35-38; This is believed to be 0 film stress which reads on Applicants value of film stress of 0.2 MPa or less.) The crystal grain size of the CrC thin film can be 3 to 7 nm. (See Abstract)

Regarding claim 34, there are two light reducing layers. (Column 7 lines 48-54)

Regarding claim 35, there is an anti-reflection layer. (Column 7 lines 55-57)

Regarding claims 29, 36, a photomask can be manufactured from the blank. (Column 12 lines 39-40)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-9, 11-13, 18-20, 24, 25, 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carcia et al. (U.S. Pat. 6,756,161) in view of Kureishi et al. (U.S. Pat. 6,740,208).

Regarding claims 1, 7, 29, Carcia et al. teach a method and apparatus for fabricating a binary photomask blank for selected wavelengths of < 400 nm. (See Abstract) Carcia et al. teach in Fig. 1 providing a substrate 4 and a target 2 in a vacuum chamber where the process pressure is kept from 10^{-3}-10^{-5} Torr. A first particle beam is provided from a deposition gun 1. Ions from gun 1 sputter the target to deposit a film on the substrate 4. A Cr film can be deposited for example. (Column 4 lines 13-49) Carcia et al. teach that the photomask blank is irradiated by a second ion beam from an assist gun 6. (Column 4 lines 13-49)

Regarding claim 2, Carcia et al. teach that the first particle beam sputters the target 4 such that particles emerge in a direction of the substrate to deposit on the substrate. (Column 4 lines 13-49)

Regarding claim 3, Carcia et al. teach utilizing the apparatus to produce a multilayer stack of CrO/CrN. (Column 5 lines 24-33)

Regarding claim 4, Carcia et al. teach in Fig. 1 a target with a normal line and the first particle beam hitting the target under an angle to the target normal line. (See Fig. 1)

Regarding claim 5, Carcia et al. teach in Fig. 1 a substrate normal line and sputtered particles (i.e. Si) from the target hit the photomask blank under an angle to the substrate normal line. (See Fig. 1)

Regarding claim 6, Carcia et al. teach that the deposition rate can be greater than 0.1 nm/min. (Column 4 lines 45-47)

Regarding claim 8, Carcia et al. teach in Fig. 1 a substrate normal line and the second particle beam hitting the photomask blank at an angle to the substrate normal line. (See Fig. 1)

Regarding claims 9, Carcia et al. teach that both guns 1 and guns 6 can be ion guns. (Column 4 lines 13-49)

Regarding claim 11, Carcia et al. teach that the ion guns 1 and 6 are both separately controlled to have different levels of energy with the assist ion beam gun producing ions with a lower energy than that of the deposition ion gun 1. (Column 4 lines 53-59)

Regarding claims 12, Carcia et al. teach that the deposition ion gun can utilize inert gas and that the assist ion gun can utilize reactive gases. (Column 4 lines 13-42)

Regarding claim 13, Carcia et al. teach that the particles of the two ion guns will have different energies. (Column 4 lines 53-59)

Regarding claim 18, Carcia et al. teach that one of the layers can be doped with the second particle beam utilizing reactive gas. (Column 5 lines 24-33; Example)

Regarding claim 19, Carcia et al. teach that multilayers can be deposited with differently doped layers. (Column 5 lines 24-33)

Regarding claims 20, Carcia et al. teach that optical density can be controlled by doping. (Column 6 lines 1-20)

Regarding claim 24, Carcia et al. teach the first particle beam to be an ion beam. (Column 4 lines 18-28)

Regarding claim 25, Carcia et al. teach the ion beam can be Xe. (Column 4 lines 18-28)

Regarding claim 27, Carcia et al. teach utilizing the apparatus to produce a multilayer stack of CrO/CrN. (Column 5 lines 24-33) Carcia et al. teach the ion beam can be Xe. (Column 4 lines 18-28)

The differences between Carcia et al. and the present claims is that the film stress is not discussed (Claims 1, 29).

Regarding the film stress of claims 1, 29, Carcia teach that in a dual ion beam deposition ***the angles between the target, the substrate, and the ion guns can be adjusted to optimize for film uniformity and film stress***. (Carcia et al. Column 2 lines 41-44) Kureishi et al. teach that for fabricating photomask the ion beam assist gun can be controlled such that the photomask can have a stress of zero. (Kureishi et al. Column 3 lines 46-59).

The motivation for controlling the assist ion beam is that it allows control a stress of the film to be zero so that a sufficient optical density can be obtained. (Column 3 lines 46-59; Column 2 lines 30-32)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Carcia et al. by controlling the assist ion beam for controlling the film stress to be zero in the photomask as taught by Kureishi et al. because it allows for obtaining a sufficient optical density.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Carcia et al. in view of Kureishi et al. as applied to claims 1-9, 11-13, 18-20, 24, 25, 27 and 29 above, and further in view of Campbell et al. (U.S. Pat. 4,885,070).

The differences not yet discussed is that the use of an electromagnetic field to direct particles is not discussed (Claim 10).

Regarding claim 10, Campbell et al. teach utilizing electromagnetic coils for restricting the plasma ions in the tubular zone of an ion gun and the target. (Column 5 lines 26-33; Column 8 lines 32-47)

The motivation for utilizing an electromagnetic coil in an ion beam sputtering apparatus is that it allows for restricting the plasma ions in the tubular zone of the ion gun and the target. (Column 5 lines 26-33)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized electromagnets as taught by Campbell et al. because it allows for restricting the plasma ions in the tubular zone of the ion gun and the target.

Claims 14 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carcia et al. in view of Kureishi et al. as applied to claims 1-9, 11-13, 18-20, 24, 25, 27 and 29 above, and further in view of Scott (U.S. Pat. 4,793,908).

The differences between Carcia et al. and the present claims is that conditioning the surface of the substrate is not discussed (Claim 14) and the reactive gas comprising oxygen is not discussed (Claim 17).

Regarding claim 14, Scott et al. teach an IBAD apparatus in which the assist ion beam device conditions the surface of the substrate by smoothing before deposition of the layers. (Column 12 lines 13-16)

Regarding claim 17, Scott et al. teach that oxygen can be utilized in the chamber. (Column 12 lines 60-62)

The motivation for conditioning and cleaning the surface of a substrate with an inert gas and a reactive gas such as oxygen is that it allows for cleaning and smoothing of the substrate. (Column 12 lines 13-16)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have cleaned a surface of the substrate from impurities by irradiating with the second particle beam before deposition of the first layer and wherein at least one reactive gas is provided in the vacuum chamber and the cleaning is enhanced by the at least one reactive gas, conditioned the surface of the substrate, and utilized a reactive gas comprising oxygen as taught by Scott et al. because it allows for cleaning and smoothing of the substrate.

Claims 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carcia et al. in view of Kureishi et al. as applied to claims 1-9, 11-13, 18-20, 24, 25, 27 and 29 above, and further in view of Yakshin (U.S. PGPub. 2004/0245090) or Mirkarimi et al. (U.S. PGPub. 2003/0164998).

The differences not yet discussed is that flattening at least one of the surface layers by irradiating with the second particle beam after deposition of the at least one layer (Claim 21), depositing further layers on the substrate where the interface roughness between the layers is reduced by irradiating with the second particle beam (Claim 22) and where the reflectance of the surface of a reflecting layer is reduced by irradiating with the second particle beam (Claim 23).

Regarding claim 21, Yakshin et al. teach that at least one layer of the multilayer system is deposited without ion beam assistance and is irradiated with ions after being deposited. (Page 2 paragraph 0026) Yakshin et al. teach that the process achieves a smoothing effect. (i.e. flattening). (Page 2 paragraph 0017) Mirkarimi et al. teach sequential deposition and etch steps. The deposition steps are carried out by ion beam sputtering and the etch steps are carried out by the secondary ion beam source. (Page 2 paragraph 0019) Mirkarimi et al. teach that the surfaces of the layers are planarized or "ion polished" (i.e. flattened). (Page 2 paragraph 0018)

Regarding claim 22, Yakshin et al. teach that after at least one layer has been deposited the layer is further irradiated with ions for some period of time before proceeding with the next layer. (Page 3 Claim 5) Here the Examiner interprets at least one to include more than one layer or multiple layers. Yakshin et al. teach that the

layers are smoothed. (i.e. flattened) (Page 2 paragraph 0017) Mirkarimi teach that the layers of the multilayer structure are etched after depositing to produce planarized layers in the multilayer thus reducing roughness. (Page 2 paragraph 0018)

Regarding Claim 23, Yakshin et al. teach smoothing the layers for effecting the reflectivity of the layers. (See Abstract) Mirkarimi et al. teach that the reflectivity of the layer is decreased by utilizing their ion polishing process. (Page 3 paragraph 0026) Carcia et al. discussed above establish the use of a Xe ion beam. (See Carcia et al. discussed above)

The motivation for flattening at least one of the surface layers by irradiating with the second particle beam after deposition of the at least one layer, for depositing further layers on the substrate where the interface roughness between the layers is reduced by irradiating with the second particle beam and where the reflectance of the surface of a reflecting layer is reduced by irradiating with the second particle beam is that it allows for improving surface properties of the deposited multilayer (Yakshin et al. Page 1 paragraph 11) or improving thickness uniformity of the deposited layers. (Mirkarimi et al. Page 1 paragraph 0009)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Carcia et al. by flattening at least one of the surface layers by irradiating with the second particle beam after deposition of the at least one layer, by depositing further layers on the substrate where the interface roughness between the layers is reduced by irradiating with the second particle beam and reducing the reflectance of the surface of a reflecting layer by irradiating with the

second particle beam as taught by Yakshin et al. or Mirkarimi et al. because it allows for improving surface properties of the deposited multilayer or improving thickness uniformity of the deposited layers.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable Carcia et al. in view of Kureishi et al. as applied to claims 1-9, 11-13, 18-20, 24, 25, 27 and 29 above, and further in view of Yakshin et al. (U.S. PGPub. 2004/0245090) or Mirkarimi et al. (U.S. PGPub. 2003/0164998).

The difference not yet discussed is where the reflectance of a reflecting layer is increases by sputtering the target by irradiating with the Xenon ion beam (Claim 26).

Regarding claim 26, Yakshin et al. teach smoothing the layers for effecting the reflectivity of the layers. (See Abstract) Mirkarimi et al. teach that the reflectivity of the layer is decreased by utilizing their ion polishing process. (Page 3 paragraph 0026) Carcia et al. discussed above establish the use of a Xe ion beam. (See Carcia et al. discussed above)

The motivation for utilizing a xenon ion beam to effect reflectance is that it allows for improving surface properties of the deposited multilayer (Yakshin et al. Page 1 paragraph 11) or improving thickness uniformity of the deposited layers. (Mirkarimi et al. Page 1 paragraph 0009)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have reduced the reflectance of the surface of a reflecting layer by irradiating with the second particle beam and utilizing a xenon ion beam to effect the reflectivity as taught by Yakshin et al. or Mirkarimi et al. because it

allows for improving surface properties of the deposited multilayer or improving thickness uniformity of the deposited layers.

Claims 30, 31 and 33-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carcia et al. in view of Kureishi et al. as applied to claims 1-9, 11-13, 18-20, 24, 25, 27 and 29 above, and further in view of Angelopoulos et al. (U.S. Pat. 6,653,027).

The differences not yet discussed is that the grain size is not discussed (Claim 30) and the surface roughness of one of the layers is not discussed (Claim 33).

Regarding claim 30, Carcia et al. teach a binary photomask blank with a substrate having single or multilayer depositing on a substrate by ion beam deposition. (See Abstract) Since the grain size is a result effective variable and since Carcia et al. use process conditions the same as Applicant the grain size is believed to be the same. (See Carcia discussed above)

Regarding claim 31, Carcia et al. teach that the mask blank is treated with a second particle beam. (Column 4 lines 32-42)

Regarding claim 33, Angelopoulos et al. teach forming a photomask blank utilizing sputtering techniques. (See Abstract; Column 3 lines 54-57) HIP sputtering targets are used to produce films having a RMS roughness of 0.20 nm. (Column 5 lines 5-7)

Regarding claim 34, Carcia et al. teach that the mask blank can have a CrN layer as the light-reducing layer. (Column 5 lines 24-33)

Regarding claim 35, Carcia et al. teach that the mask blank can have an anti-reflective layer. (Column 6 lines 1-20)

Regarding claim 36, Carcia et al. teach a photo mask utilizable in photolithography. (Example; Column 3 lines 30-39)

The motivation for producing films with a RMS roughness of less than 5 nm and small grain size is that it allows for lower defects in the film. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a low grain size as taught by Carcia et al. and to produce low roughness films as taught by Angelopoulos et al. because it allows for lower defect films.

Claims 37, 38, 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carcia et al. in view of Kureishi et al. as applied to claims 1-9, 11-13, 18-20, 24, 25, 27 and 29 above, and further in view of Scott (U.S. Pat. 4,793,908).

Regarding claim 37, Carcia et al. teach a method and apparatus for fabricating a binary photomask blank for selected wavelengths of < 400 nm. (See Abstract) Carcia et al. teach in Fig. 1 providing a substrate 4 and a target 2 in a vacuum chamber where the process pressure is kept from 10^{-3}-10^{-5} Torr. A first particle beam is provided from a deposition gun 1. Ions from gun 1 sputter the target to deposit a film on the substrate 4. A Cr film can be deposited for example. (Column 4 lines 13-49) Carcia et al. teach that the photomask blank is irradiated by a second ion beam from an assist gun 6. (Column 4 lines 13-49)

Regarding claim 38, Carcia et al. teach that both guns 1 and guns 6 can be ion guns. (Column 4 lines 13-49)

Regarding claim 40, Carcia et al. teach that the deposition source and assist particle source are separably controllably be selecting the ion energies of the beams. (Column 4 lines 53-59)

Regarding claim 41, Carcia et al. teach that the two beams can be of different particles and different energies. (Column 4 lines 17-43, lines 54-59)

The differences between Carcia et al. and the present claims is that cleaning a surface of the substrate from impurities by irradiating with the second particle beam before deposition of the first layer and wherein at least one reactive gas is provided in the vacuum chamber and the cleaning is enhanced by the at least one reactive gas (Claim 37) and the geometrical orientation of the substrate relative to the target including the angle of incidence of the sputtered target atoms is adjustable to optimize the film stress to about 0.2 MPa (Claim 37).

Regarding the cleaning of a surface of the substrate from impurities by irradiating with the second particle beam before deposition of the first layer and wherein at least one reactive gas is provided in the vacuum chamber and the cleaning is enhanced by the at least one reactive gas (Claim 37), Scott et al. teach an IBAD apparatus in which the assist ion beam device conditions the surface of the substrate by smoothing before deposition of the layers. (Column 12 lines 13-16) Scott et al. teach an IBAD apparatus in which the assist ion beam device also cleans the surface of the substrate before depositing a layer. (Column 12 lines 13-16) Scott et al. teach that the assist ion beam

can formed of a mixture of argon, xenon and oxygen gases. (Column 12 lines 60-62) Scott et al. teach that oxygen can be utilized in the chamber. (Column 12 lines 60-62)

The motivation for conditioning and cleaning the surface of a substrate with an inert gas and a reactive gas such as oxygen is that it allows for cleaning and smoothing of the substrate. (Column 12 lines 13-16)

Regarding the geometrical orientation of the substrate relative to the target including the angle of incidence of the sputtered target atoms is adjustable to optimize the film stress to about 0.2 MPa (Claim 37), Carcia teach that in a dual ion beam deposition ***the angles between the target, the substrate, and the ion guns can be adjusted to optimize for film uniformity and film stress***. (Carcia et al. Column 2 lines 41-44) Kureishi et al. teach that for fabricating photomask the ion beam assist gun can be controlled such that the photomask can have a stress of zero. (Kureishi et al. Column 3 lines 46-59).

The motivation for controlling the assist ion beam is that it allows control a stress of the film to be zero so that a sufficient optical density can be obtained. (Column 3 lines 46-59; Column 2 lines 30-32)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have cleaned a surface of the substrate from impurities by irradiating with the second particle beam before deposition of the first layer and wherein at least one reactive gas is provided in the vacuum chamber and the cleaning is enhanced by the at least one reactive gas, conditioned the surface of the substrate,

and utilized a reactive gas comprising oxygen as taught by Scott et al. because it allows for cleaning and smoothing of the substrate.

Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Carcia et al. in view of Kureishi et al. and further in view of Scott as applied to claims 1-9, 11-13, 18-20, 24, 25, 27, 29, 37, 38, 40 and 41 above, and further in view of Campbell et al. (U.S. Pat. 4,885,070).

The difference not yet discussed is that the use of an electromagnetic field to direct particles is not discussed (Claim 39).

Regarding claim 39, Campbell et al. teach utilizing electromagnetic coils for restricting the plasma ions in the tubular zone of an ion gun and the target. (Column 5 lines 26-33; Column 8 lines 32-47)

The motivation for utilizing an electromagnetic coil in an ion beam sputtering apparatus is that it allows for restricting the plasma ions in the tubular zone of the ion gun and the target. (Column 5 lines 26-33)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized electromagnets as taught by Campbell et al. because it allows for restricting the plasma ions in the tubular zone of the ion gun and the target.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct

from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., In re Berg, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); In re Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); In re Van Ornum, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); In re Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and In re Thorington, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-14, 17-25 and 27, 29-41are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over the claims of copending Application No. 10/367,539 in view of Carcia et al. (U.S. Pat. 6,756,161) and Kureishi et al. (U.S. Pat. 6,740,208).

The claims of copending Application No. 10/367,539 teach Applicant's method. (See claims of Application No. 10/367,539)

The difference between the claims of Application No. 10/367,539 and the present claims is that the first particle beam comprising an ion beam is not discussed (Claim 24), the use of a Xe ion beam is not discussed (Claim 25) and the stress in the film is not discussed.

Regarding claim 24, Carcia et al. teach utilizing a beam of ions from the deposition gun to sputter the target. (Column 4 lines 22-26)

Regarding claim 25, Carcia et al. teach utilizing Xe as the ion beam. (Column 4 lines 22-26)

The motivation for utilizing an ion beam of Xe for the sputtering is that it allows for producing masks with fewer defect particles. (Column 4 line 14)

Carcia et al. teach that the assist ion beam can be controlled and placed at a selected distance from the substrate such that the film stress can be reduced. (Carcia et al. Column 4 lines 62-65 ; Column 5 lines 9-13 ; Column 5 lines 18-23) Kureishi et al. teach that for fabricating photomask the ion beam assist gun can be controlled such that the photomask can have a stress of zero. (Kureishi et al. Column 3 lines 46-59).

The motivation for controlling the assist ion beam is that it allows control a stress of the film to be zero so that a sufficient optical density can be obtained. (Column 3 lines 46-59; Column 2 lines 30-32)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Application No. 10/367,539 by utilizing a Xe ion beam and controlled the stress of the film as taught by Carcia et al. and Kureishi et al. because it allows for producing masks with fewer defect particles and for producing a film with sufficient optical density.

This is a provisional obviousness-type double patenting rejection.

Claim 26 is provisionally rejected under the judicially created doctrine of obviouness-type double patenting as being unpatentable over Application No. 10/367,539 in view of Carcia et al. (U.S. Pat. 6,756,161) and Kureishi et al. (U.S. Pat. 6,740,208) as applies to claims 1-14, 17-25, 27, 29-41 above and further in view of Yakshin et al. (U.S. PGPub 2004/0245090) or Mirkarimi et al. (U.S. PGPub 2003/0164998).

The difference not yet discussed is increasing the surface reflectance.

Regarding claim 26, Yakshin et al. teach smoothing the layers for effecting the reflectivity of the layers. (See Abstract) Mirkarimi et al. teach that the reflectivity of the layer is effected by utilizing their ion polishing process. (Page 3 paragraph 0026) Carcia et al. discussed above establish the use of a Xe ion beam for the assist beam. (See Carcia et al. discussed above)

The motivation for utilizing a Xe ion beam to effect reflectance of the layers is that it allows for improving surface properties of the deposited multilayer (Yakshin et al. Page 1 paragraph 11) or improving thickness uniformity of the deposited layers. (Mirkarimi et al. Page 1 paragraph 0009)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a Xe ion beam to effect the reflectance of the layers as taught by Yakshin et al. or Mirkarimi et al. because it allows for improving the surface properties of the deposited multilayer or improving the thickness uniformity of the deposited layers.

This is a <u>provisional</u> obviousness-type double patenting rejection.

REMARKS:

In response to the argument that the prior art does not suggest adjusting the angle of incidence of the sputtered target atoms onto the substrate in order to control the stress of the film, it is argued that Carcia et al. teach adjusting the angles of the target, the substrate and the ion guns in order to control the stress of the film. (See Carcia et al. Column 2 lines 41-45)

In response to the argument that the prior art does not teach the deposition rate, it is argued that Carcia et al. teach that the deposition rate should be greater than .0016 nm/second which encompasses applicant's claimed range. (See Carcia et al. discussed above)

In response to the argument that the prior art of record does not teach utilizing a Xenon ion assist source, it is argued that Carcia et al. teach utilizing xenon as a gas for the ion sources. (See Carcia et al. discussed above)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Art Unit 1753

RM
August 7, 2006